APPLICATION FOR PATENT

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Title: Modular Construction System for Use With Poured Concrete or Light Concrete

FIELD AND BACKGROUND OF THE INVENTION

The present invention relates to poured concrete construction methods and, in particular, it concerns a modular system for the construction of floors, walls and foundations using concrete or light concrete.

Concrete walls traditionally have been constructed by first setting up two spaced apart form panels and pouring concrete into the space between the form panels. After the concrete hardens, the builder then removes the forms, leaving the cured concrete wall. This technique has been found to present a number of drawbacks. For example, formation of concrete walls and floors using the traditional technique is inefficient because of the time required to erect the forms, wait until the concrete cures, and take down the forms. a further drawback is the use of cranes and similar heavy machinery used to set some forms in place. The traditional forming and fabricating technique, therefore, is an expensive, labor-intensive process. Further time and expense in incurred in order to attach finish covering to the walls and ceilings.

Techniques have been developed for forming modular concrete walls. Some modular walls are constructed using an insulating material for the form panels. The modular form panels are set up, typically generally parallel to each

other, with connecting components holding the two form panels in place relative to each other. Concrete is then poured into the space between the form panels. Unlike the traditional forming technique, however, the insulating form panels remain in place after the concrete has cured. That is, the form panels become a permanent part of the building after the concrete cures. The concrete walls made using this technique can be stacked on top of each other many stories high to form all of a building's walls. The developers of such systems, however, have gone to great lengths to devise ways to connect the form panels, as evidenced by U.S. Patent No. 4,730,422 to Young.

There is therefore a need for a modular system for the construction of concrete floors and walls, in which the form panels include a substantially finished outer surface on at least one side of the wall and provides for easy attachment of ceiling finishing material. It would be beneficial if the system provided for instillation of plumbing and electrical components after the concrete has cured.

SUMMARY OF THE INVENTION

The present invention is a modular system for the construction of concrete floors and walls.

According to the teachings of the present invention there is provided, A method for fabrication of a concrete floor comprising: (a) deploying a plurality of interconnected floor-and-beam forming elements so as to construct a substantially horizontal floor mold, each the floor-and-beam forming element

configured with at least one beam-forming trough flanked by floor-forming support; (b) deploying a plurality of support plates such that at least one the support plate is deployed between adjacent ones of the beam-forming troughs so as to span a distance between the adjacent ones of the beam-forming troughs, the support plates connected to facing sides of the adjacent ones of the beam-forming troughs and an underside of the floor-forming supports, the support plates projecting downwardly substantially perpendicular to the floor-forming supports and substantially perpendicular to a length of the beam-forming troughs; (c) deploying a volume of fluid concrete onto a top surface of the floor area such that the fluid concrete substantially fills the beam-forming troughs and regions above the floor-forming supports are covered to a predefined depth; and (d) allowing the fluid concrete to cure.

According to a further teaching of the present invention there is also provided attaching at least one floor thickness guide to a top surface of at least one the floor-forming support, so as to facilitate determination of the predefined depth of the fluid concrete.

According to a further teaching of the present invention the at least one floor thickness guide is implemented as a plurality of the floor thickness guides deployed such that the top surfaces of the plurality of the floor thickness guides is co-planar.

According to a further teaching of the present invention the interconnection of the floor-and-beam forming elements is implemented such that a top surface of the floor-forming supports is substantially co-planar.

According to a further teaching of the present invention, implementation of the interconnection includes attachment of two adjacent floor-forming supports.

According to a further teaching of the present invention, the support plates are implemented with an outer contour that is substantially equivalent to a cross section of an area below the floor-forming support, between the adjacent ones of the beam-forming troughs and a line connecting bottom surfaces of the adjacent ones of the beam-forming troughs.

According to a further teaching of the present invention the deploying a plurality of support plates includes insertion of tabs protruding from edges of the support plates through corresponding slots provided in the floor-and-beam forming elements, thereby providing a plurality of anchoring points for the concrete.

According to a further teaching of the present invention, at least one of the plurality of support plates is implemented with precut holes to accommodate plumbing and electrical components.

According to a further teaching of the present invention there is also provided deployment of a false bottom in at least one the beam-forming trough so as to prevent the fluid concrete from flowing therein so as to form a void in a bottom region of the beam-forming trough into which fasteners penetrate, thereby facilitating attachment of ceiling finishing material.

According to a further teaching of the present invention there is also provided sealing at least one end of an area below the floor-forming support

and between the adjacent ones of the beam-forming troughs by use of an end sealing plate deployed substantially adjacent to the at least one end and projecting downwardly substantially perpendicular to the floor-forming supports and substantially perpendicular the beam-forming troughs.

According to a further teaching of the present invention the floor-and-beam forming element is implemented as an element fabricated from steel.

There is also provided according to the teachings of the present invention a method for the fabrication of a wall comprising: (a) deploying a plurality of interconnected substantially rectangular wall-forming elements on a floor, each the wall-forming element configured with at least two substantially parallel spaced apart substantially rectangular wall panels, wherein an outer surface of each of the wall panels is configured as a substantially finished wall surface, the at least two wall panels being coupled at each of four corners of the rectangle by wall-panel corner-connecting elements; and (b) deploying a volume of fluid concrete so as to substantially fill a region between the wall panels.

According to a further teaching of the present invention, each one of the plurality of the wall-forming elements is interconnected to adjacent ones of the plurality of the wall-forming elements by attachment of adjacent ones of the wall-panel corner-coupling brackets one to another.

According to a further teaching of the present invention the wall-panel corner-connecting element is implemented as a substantially "L" shaped element, the wall-panel corner-connecting element thereby spanning at least a

partial length of two sides of the wall-forming element when attached to the wall panels.

According to a further teaching of the present invention, the attachment of the adjacent ones of the wall-panel corner-coupling brackets one to another is implemented using self-tapping sheet metal screws.

According to a further teaching of the present invention, the coupling of the wall panels is implemented by providing a lengthwise groove in each edge surface of each the wall panels into which a tongue protruding form each the wall-panel corner-coupling bracket is affixed.

There is also provided according to the teachings of the present invention a system for fabrication of a concrete floor comprising: (a) a plurality of interconnected floor-and-beam forming elements so as to construct a substantially horizontal floor mold, each the floor-and-beam forming element configured with at least one beam-forming trough flanked by floor-forming support; and (b) plurality of support plates such that at least one the support plate is deployed between adjacent ones of the beam-forming troughs so as to span a distance between the adjacent ones of the beam-forming troughs, the support plates connected to facing sides of the adjacent ones of the beam-forming troughs and an underside of the floor-forming supports, the support plates projecting downwardly substantially perpendicular to the floor-forming supports and substantially perpendicular to a length of the beam-forming troughs; wherein a volume of fluid concrete is poured onto a top surface of the floor area such that the fluid concrete substantially fills the beam-forming

troughs and regions above the floor-forming supports are covered to a predefined depth, and allowing the fluid concrete to cure.

According to a further teaching of the present invention there is also provided at least one floor thickness guide attached to a top surface of at least one the floor-forming support, so as to facilitate determination of the predefined depth of the fluid concrete.

According to a further teaching of the present invention the at least one floor thickness guide is implemented as a plurality of the floor thickness guides deployed such that the top surfaces of the plurality of the floor thickness guides is co-planar.

According to a further teaching of the present invention the interconnection of the floor-and-beam forming elements is such that a top surface of the floor-forming supports is substantially co-planar.

According to a further teaching of the present invention, the interconnection includes attachment of two adjacent floor-forming supports.

According to a further teaching of the present invention, the support plates have an outer contour that is substantially equivalent to a cross section of an area below the floor-forming support, between the adjacent ones of the beam-forming troughs and a line connecting bottom surfaces of the adjacent ones of the beam-forming troughs.

According to a further teaching of the present invention the plurality of support plates are deployed such that tabs protruding from edges of the support plates are inserted through corresponding slots provided in the floor-and-beam

forming elements, thereby providing a plurality of anchoring points for the concrete.

According to a further teaching of the present invention, at least one of the plurality of support plates includes precut holes to accommodate plumbing and electrical components.

According to a further teaching of the present invention there is also provided a false bottom deployed in at least one the beam-forming trough so as to prevent the fluid concrete from flowing therein so as to form a void in a bottom region of the beam-forming trough into which fasteners penetrate, thereby facilitating attachment of ceiling finishing material.

According to a further teaching of the present invention there is also provided at least one end sealing plate configured to seal at least one end of an area below the floor-forming support and between the adjacent ones of the beam-forming troughs, the end sealing plate deployed substantially adjacent to the at least one end and projecting downwardly substantially perpendicular to the floor-forming supports and substantially perpendicular the beam-forming troughs.

According to a further teaching of the present invention, the floor-and-beam forming element is fabricated from steel.

There is also provided according to the teachings of the present invention a system for the fabrication of a wall comprising a plurality of interconnected substantially rectangular wall-forming elements deployed on a floor, each the wall-forming element configured with at least two substantially

parallel spaced apart substantially rectangular wall panels, wherein an outer surface of each of the wall panels is configured as a substantially finished wall surface, the at least two wall panels being coupled at each of four corners of the rectangle by wall-panel corner-connecting elements, wherein a volume of fluid concrete is poured so as to substantially fill a region between the wall panels.

According to a further teaching of the present invention each one of the plurality of the wall-forming elements is interconnected to adjacent ones of the plurality of the wall-forming elements is by attachment of adjacent ones of the wall-panel corner-coupling brackets one to another.

According to a further teaching of the present invention the wall-panel corner-connecting element is a substantially "L" shaped element, the wall-panel corner-connecting element thereby spanning at least a partial length of two sides of the wall-forming element when attached to the wall panels.

According to a further teaching of the present invention the adjacent ones of the wall-panel corner-coupling brackets is attached one to another using self-tapping sheet metal screws.

According to a further teaching of the present invention the wall panels include a lengthwise groove in each edge surface of each the wall panels into which a tongue protruding form each the wall-panel corner-coupling bracket is affixed.

There is also provided according to the teachings of the present invention a method for fabrication of a building foundation constructed on a pre-graded site comprising: (a) deploying a layer of gravel so as to cover a per-

defined surface area of the site to a predefined depth; (b) deploying on the layer of gravel a symmetrical arrangement of a plurality of spaced apart foundation cavity forms so as to form trough regions between adjacent ones of the foundation cavity forms, the symmetrical arrangement substantially covering a predefined surface area of the gravel, the foundation cavity forms configured so as to form a cavity region thereunder; (c) erecting a foundation boarder so as to define a periphery of the foundation; (d) deploying an amount of fluid concrete within the foundation boarder so as to substantially fill the trough regions and a region above the foundation cavity forms to a substantially uniform predefined depth, and the foundation cavity forms prevent the flow of the fluid concrete into the cavity region; (e) leveling a top surface of the concrete; and (f) allowing the concrete to cure.

According to a further teaching of the present invention, the foundation cavity forms are implemented as four connected side panels connected to a top panel configured from at least one piece of material.

According to a further teaching of the present invention the at least one piece of material is implemented as a sheet of metal.

According to a further teaching of the present invention there is also provided deploying floor support elements projecting upwards from the top surface of the concrete so as to support a floor a distance of between 0.5 – 1.5 meters above the top surface, thereby forming a service space between the top surface and bottom surface of the floor.

There is also provided according to the teachings of the present invention a building foundation for deployment on a pre-graded site covered by a layer of gravel, the building foundation comprising: (a) a symmetrical arrangement of a plurality of spaced apart foundation cavity forms deployed on the layer of gravel so as to form trough regions between adjacent ones of the foundation cavity forms, the symmetrical arrangement substantially covering a predefined surface area of the gravel, the foundation cavity forms configured so as to form a cavity region thereunder; and (b) a foundation boarder erected so as to define a periphery of the foundation; wherein an amount of fluid concrete is deployed within the foundation boarder so as to substantially fill the trough regions and a region above the foundation cavity forms to a predefined depth, and the foundation cavity forms prevent the flow of the fluid concrete into the cavity region.

According to a further teaching of the present invention, the foundation cavity forms are configured as four connected side panels connected to a top panel configured from at least one piece of material.

According to a further teaching of the present invention the at least one piece of material includes a sheet of metal.

According to a further teaching of the present invention there is also provided floor support elements projecting upwards from the top surface of the concrete so as to support a floor a distance of between 0.5 – 1.5 meters above the top surface, thereby forming a service space between the top surface and bottom surface of the floor.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is herein described, by way of example only, with reference to the accompanying drawings, wherein:

FIG. 1 is a perspective end view of a preferred embodiment of a floor-and-beam forming element constructed and operative according to the principles of the present invention;

FIGS. 2a and 2b are perspective views of preferred embodiments of support plates constructed and operative according to the principles of the present invention, FIG. 2a having pre-cut holes for instillation of plumbing and electrical components;

FIG. 2c is a perspective view of a preferred embodiment of an end sealing plate constructed and operable according to the teachings of the present invention;

FIG. 3 is perspective view of an assembled floor area of floor-and-beam forming elements constructed and operative according to the principles of the present invention;

FIG. 4 is a perspective view of a preferred embodiment of a floor-thickness guide constructed and operative according to the principles of the present invention;

FIG. 5 is a cut-away perspective view of an assembled floor area of floor-and-beam forming elements, showing deployment of the support plate of FIG. 2a;

FIG. 6 is an end view of the floor-and-beam forming element of FIG. 1, showing deployment of a preferred embodiment of a false bottom deployed at the bottom of a beam-forming trough;

FIG. 7 is a perspective view of a preferred embodiment of a wall-forming element constructed and operative according to the principles of the present invention;

FIG. 8 is a perspective view of a full wall form consisting of a plurality of the wall-forming elements of FIG. 7;

FIG. 9 is a detail of a cross-section taken along line a of FIG. 7;

FIG. 10 is a perspective view of a wall-panel corner-coupling bracket constructed and operative according to the principles of the present invention;

FIG. 11 is a perspective view of a wall corner constructed and operable according to the teachings of the present invention;

FIG.12 is a perspective view of a wall-corner bracket constructed and operable according to the teachings of the present invention;

FIG. 13 is a perspective view of two door and/or window caps constructed and operable according to the teachings of the present invention;

FIG. 14 is a perspective view of a symmetrical arrangement of foundation cavity forms according to the teaching of the present invention;

FIG. 15 is a perspective view of a foundation cavity form constructed and operable according to the teachings of the present invention; and

FIG. 16 is aside elevation of a foundation and associated service space constructed and operable according to the teachings of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention is a modular system for the construction of concrete floors and walls.

The principles and operation of a modular system for the construction of concrete floors and walls according to the present invention may be better understood with reference to the drawings and the accompanying description.

By way of introduction, the system of the present invention relates to the formation of the majors components of any building, namely floors/ceilings (FIGS. 1-6), walls (FIGS. 7-13) and the foundation (FIGS. 14-16). It is a principle of the present invention to pre-fabricate the form elements such that fluid concrete is poured into, or onto, the forms and, once the concrete is cured, these form elements become part of the finished building. It will be appreciated that the major components of the present invention are put to optimal use when used together as a building system, however, each may be used separately with other building components. That is, a foundation constructed and operable according to the teachings of the present invention may be used to support a building constructed using substantially any build technique. Further, walls constructed and operable according to the teachings of the present invention may be constructed on substantially any foundation or floor structure. Likewise, floors constructed and operable according to the teachings of the present invention may be supported by walls constructed using substantially any build technique.

According to the present invention, the pre-fabricated wall forms include the intended finished surfaces of the walls, such as but not limited to, marble, granite or other stone, pre-cast concrete, metal, gypsum board, and wood or wood products. Alternatively, the finished surface of the wall panel may be one that will accept a final finish coating, such as but not limited to, paint and wall paper, with minimal preparation.

The floor/ceiling forms are configured such that the ceiling finishing material, such as but not limited to, sheet rock, any commercially available ceiling material and suspending ceiling grid elements, may be readily attached. Floor finishing material, such as but not limited to, tiles, linoleum, and carpeting, may installed directly of the cured concrete floor with minimal preparation to the surface of the concrete.

Referring now to the construction of floors and ceilings according to the teachings of the present invention, there are three main components that are assemble at the construction site in order to construct a floor. While all of the components of the present invention, with the exception of the wall panels, described herein are preferably produced from sheets, or rolls, of steel, each of these components may be produced from any suitable material, such as, but not limited to, sheet metal, aluminum, carbon composites, fiberglass, and plastics.

The thickness of the finished floor may be varied, as required for each application depending on the span and weight requirements, by varying the depth of the concrete when it is poured onto the surface of the floor forms. It will be appreciated that the underside of subsequent finished floors will provide

the ceiling for the rooms below. The thickness of the floor that is in contact with the ground may be of such a thickness so as to constitute the foundation of the building. An alternative preferred embodiment of a foundation is discussed with regard to Figures 14-16.

Turning now to Figure 1, a floor-and-beam forming element **2** according to the present invention is illustrated. The floor-and-beam forming element **2** is configured with a beam-forming trough **4** flanked by floor-forming supports **6** and **8** located on opposite sides of the trough **4**. It should be noted that the walls **150** of the beam-forming troughs may extend downwardly from the floor-forming supports at substantially any angle including perpendicularly. A full floor mold consists of a plurality of interconnected floor-and-beam forming elements, as illustrated in Figure 3. The floor-and-beam forming elements preferably may be connected by over lapping the edge **10** of floor-forming support **6** of one floor-and-beam forming element with the edge **12** of floor-forming support **8** of the adjacent floor-and-beam forming element. Further rigidity may be supplied by insertion of a plurality of support plates **22**. Each of the support plates is deployed between adjacent beam-forming troughs so as to span the distance between the beam-forming troughs. The support plates are connected to the underside of the floor-and-beam forming elements and project downwardly substantially perpendicular to the floor-forming supports and substantially perpendicular the side of the beam-forming troughs.

When produced from steel, as illustrated herein, the floor-and-beam forming elements may be fabricated, on or off the job site, from a roll of

material that passes through a suitable shaping machine such as is commonly use in the fabrication of "continuous rain gutters." An advantage of the style of fabrication is the ability to produce floor-and-beam forming elements of the required length from individual elements of the correct length. Alternately, floor-and-beam forming elements may be produced off site from individual steel sheets by use of a press.

As illustrated in Figures 2a and 2b a support plate may be configured as a substantially solid plate **22**, or the support plate may be configured with an array of holes **24** suitable for the passage of plumbing and electrical components, as illustrated in support plate **20**. Attachment of the support plates to the floor-and-beam forming elements is accomplished by insertion of attachment tabs **26** on the support plates through corresponding slots (not shown) in the floor-and-beam forming elements. Once inserted, the attachment tabs may be bent or twisted to hold the support plates securely in place. The protruding attachment tabs **26** also provide anchor points for the concrete, as discussed below. Preferably, the support plates are deployed such that at least one of the support plates is deployed between adjacent beam-forming troughs so as to span the distance between the adjacent beam-forming troughs. The support plates are connected to facing sides of the beam-forming troughs and the underside of the floor-forming supports, so as to project downwardly substantially perpendicular to the floor-forming supports and substantially perpendicular to the length of the beam-forming troughs.

An embodiment of a floor-thickness guide **30** constructed according to the teachings of the present invention, as illustrated in figure 4, is implemented as a rail having a substantially "L" shaped cross section deployed such that one edge of the "L" constitutes a top surface of the floor thickness guide, and the other edge of the "L" is substantially equal to the predefined depth. With large floor areas, a plurality of floor thickness guides is deployed such that the top surfaces of each of the floor thickness guides are co-planar. The floor thickness guides may be attached to the floor-and-beam forming elements **2** preferably substantially midway between adjacent beam-forming troughs **4**. It should be noted that a floor-thickness guide **30** may be deployed substantially at any point between beam-forming troughs **4**. The floor-thickness guide is attached to the floor-and-beam forming elements by insertion of attachment tabs **34**, on bracket **34**, into slots (not shown) in the floor-and-beam forming elements.

In some applications, it may be necessary to provide an area for what is commonly referred to as a "wet room," such as, but not limited to a room the houses a toilet, bath tub, shower, laundry facilities, or any combination of these. Typically, the surface of the floor of a wet room is 2-3 cm lower than the surface of the surrounding floor area. Construction of such a lowered floor surface may be accomplished, for example, by surrounding the periphery of the wet room with floor thickness guides of the height used for the higher "normal" height floor, and deploying floor thickness guides that are 2-3 cm shorter in the area of the wet room.

The dimensions of the floor-and-beam forming elements **2** may be varied so as to meet the requirements of a particular building project. That is, as illustrated in Figure 6, dimension **50** may be varied to adjust the beam height, and dimensions **52** and **54** may be varied to adjust the beam width. Dimensions **56** and **58** may be varied to adjust the span between beams. The height **60** of the floor-thickness guides (Figures 3 and 4) may be varied to adjust the thickness of the floor.

A full floor mold consisting of a plurality of floor-and-beam forming elements is assembled to the required dimensions such that the top surfaces of the floor-forming supports lie substantially in a plane substantially parallel to the plane of the finished floor as defined in the architectural plans. It should be noted that the principles of the present invention are equally applicable to substantially any floor surface whether horizontal or sloping. According to the principles of the present invention, a floor may be constructed at substantially any degree of slope onto which fluid concrete may be poured with utility. The top surfaces of the floor-thickness guides are substantially all co-planar. Once the full floor area of floor-and-beam forming elements is assembled, fluid concrete is poured onto the top surface thereby filling the beam-forming troughs and area above the floor-forming supports with a volume of fluid concrete to a depth as indicated by the floor-thickness guides. The fluid concrete is then leveled using the top surface of the floor-thickness guides **30** as supports for the leveling instrument, such as a substantially straight board of suitable length, as is a common practice in concrete construction. The plurality

of support plates **20** and **22** provide further support for the floor-forming supports **6** and **8**, rigidity against twisting for the beam-forming troughs **4**, and as the concrete cures, the plurality of attachment tabs **26** provide anchoring points for the concrete. When the floor-and-beam forming elements are deployed atop a wall, it may be necessary to seal the area under the floor-forming supports between the beam-forming troughs. In such instances, an end sealing plate **28**, such as the non-limiting example illustrated in Figure 2c, is attached to the floor-and-beam forming elements projecting downwardly substantially perpendicular to said floor-forming supports and substantially perpendicular said beam-forming troughs substantially adjacent to the end of the floor-and-beam forming elements. Such attachment is preferably by use of self-tapping sheet metal screws, however, any suitable fastener, such as but not limited to, screws, pop rivets, and nuts and bolts may be used.

During assembly of the full floor area of floor-and-beam forming elements, support plates **20** with pre-cut holes may be deployed as required by the architectural plans. This facilitates the instillation of plumbing and electrical components, allowing the components to past through the holes. At points where is it necessary for the plumbing or electrical components to past through the floor, a custom hole may be cut using any number of hole-cutting tools. When it is necessary for the plumbing or electrical components to be installed in a direction perpendicular to the beam troughs, a hole is cut through the appropriate beam troughs after the concrete has cured.

In some applications, the exposed steel bottom surface may be suitable as the finished ceiling surface. Alternatively, for applications where a substantially planar ceiling surface is required, a false bottom **60** may be deployed in the bottom of the beam-forming troughs before the fluid concrete is poured so as to create a hollow space, or void, a the bottom of the troughs when the concrete cures. This enables the insertion of fasteners, such as, but not limited to, screws and pop-rivets through the steel at the bottom of the beam-forming so as to attach ceiling finishing elements, such as, but not limited to, sheet rock and suspending ceiling grid elements.

Turning now to the construction of wall according to the present invention, and in particular the fabrication of wall-forming elements **100**, each of which is separately pre-fabricated by coupling two substantially rectangular wall panels **102a** and **102b** at each of their four corners using substantially "L" shaped corner-coupling brackets **104** configured so as to span at least part of the length of two adjacent sides of the wall panels **102a** and **102b**. A plurality of wall-forming elements is used for wall construction. Preferably, as illustrated in Figure 9, the wall-forming elements **100** include an exterior wall panel **102a** and an interior wall panel **102b** both of which are configured with a lengthwise groove **108** on the each of the end surface into which a tongue **106** protruding from each of the wall-panel corner-coupling brackets is inserted and affixed, preferably with and adhesive such as, but not limited to, epoxy or plastic resins. The outside wall panel may be configured from a single piece of exterior wall material. Optionally, the exterior wall panel may be configured

from a pre-cast concrete panel **110** to which a decorative covering **112**, such as but not limited to, marble, granite, other decorative stone, and mirrored glass, is attached. For application where the required insulation factor is higher than of concrete alone, insulation **140** may be deployed in the space between the wall panels. The insulation may be in the form of, for example solid panels or foams that applied directly to the inside surface of the wall panels. Preferably, the insulation is provide adjacent to the inside surface of the exterior wall panel.

The interior wall panel **102b** may be configured from substantially any interior wall material, such as but not limited to, gypsum board, wood, and pre-cast concrete.

A full wall form consists of a plurality of adjoining wall-forming elements **100**, as illustrated in Figure 8. Each of the wall-forming elements **100** is deployed, either beside or on top of, another wall-forming element **100**. The wall-forming elements **100** are interconnect to adjacent ones by attaching adjacent wall-panel corner-coupling brackets **104** one to another. This may preferably be accomplished using self-tapping sheet metal screws, but by any number of attachment elements, such as, but not limited to, pop-rivets, bolts and nuts, and clamps may be used. It should be noted that the wall-panel corner-coupling brackets **104** may be interconnected to adjacent ones in any combination of ones adjacent above, below, and beside.

Wall corners are formed, as illustrated in Figure 11, by attaching two corner panels **120** and **122** to a top wall-corner bracket **124** and a bottom wall-corner bracket (not shown). The wall corner is placed at the intersection of two

wall-forming elements such that the attachment flange **126** portion of the wall-corner brackets are adjacent to the wall-panel corner-coupling brackets **104** of the adjoining wall-forming elements. The wall-corner brackets **124** are preferably attached to the wall-panel corner-coupling brackets **104** using self-tapping sheet metal screws, but by any number of attachment elements, such as, but not limited to, pop-rivets, bolts and nuts, and clamps may be used.

Similar to the wall panels mentioned above, the corner panels **120** and **122** are preferably, configured with a lengthwise groove (not shown) on the each of the end surface into which a tongue **128** protruding from the wall-corner brackets is inserted and affixed, preferably with and adhesive such as, but not limited to, epoxy or plastic resins.

When the architectural plans call for a door or window, door or window cap elements such as, but not limited, to those (**152** and **154**) illustrated in Figure 13 are attached to the edges of the appropriate wall-forming elements so as to prevent the flow of fluid concrete into the regions where the door or window is to be inserted after completion of the wall. It will be appreciated that the length and /or the width of the cap elements is varied dependent on the dimensions of the wall-forming elements to which each cap is attached.

Once the full wall forms are assembled, fluid concrete is poured into the space between the wall panels **102a** and **102b** and allowed to cure.

It will be readily appreciated that since no forms need to be removed from the finished wall and since the wall forms of the present invention provide a substantially sturdy wall before the concrete is fully cured, work may begin

on the next phase of construction without the delay of waiting for the concrete to fully cure and removal of all of the forms. Such delay is common practice with conventional concrete construction methods. That is to say, deployment of the floor/ceiling forms for the next level may be started while the concrete in the newly constructed walls is still curing.

An alternative preferred embodiment of a building foundation according to the present invention, as illustrated in Figure 14, is constructed by deploying a layer of gravel covering the graded surface area of the site to a predefined depth, preferably 20 cm. A symmetrical arrangement, such as the non-limiting example illustrated in Figure 14, of a plurality of spaced apart foundation cavity forms **200** is deployed on the layer of gravel so as to form trough regions **202** between adjacent ones of the foundation cavity forms **200** so as to substantially cover the required area of the foundation. Each of the foundation cavity forms is configured so as to form a cavity region underneath when covered by fluid concrete. A foundation boarder (not shown) is erected so as to define the periphery of the foundation. Thereafter, an amount of fluid concrete is deployed within the foundation boarder so as to substantially fill the trough regions **202** and a floor region **206** above said foundation cavity forms to a substantially uniform predefined depth. The foundation cavity forms prevent the flow of the fluid concrete into each of the cavity regions. The top surface of the floor region **206** is leveled and the concrete is allowed to cure. Thusly configured, the foundation allows the exposed ground surface in each of the

cavities to swell in response to, for example, changes in seasonal and daily weather conditions, without applying undue pressure on the foundation itself.

As shown in Figure 15, each of the foundation cavity forms **200** is configured with four connected side panels with a connected top panel. Preferably, each foundation cavity form **200** is configured from at least one piece of material, such as but not limited to, a sheet of metal. However, a plurality of pieces connected so as to form a foundation cavity form **200** is within the scope of the present invention.

The foundation may further include floor support elements **210** projecting upwards from the top surface of concrete in the floor region **206** so as to support a floor **212** a distance of between 0.5 – 1.5 meters above the floor region **206**, thereby forming a service space **220** between floor region **206** and bottom surface of the floor **212**. The floor support elements are preferably constructed from fluid concrete poured into forms deployed on floor region **206**. alternatively, the floor support elements **210** may be constructed from, by non-limiting example, pre-cast concrete, metal or wood.

It will be appreciated that the above descriptions are intended only to serve as examples and that many other embodiments are possible within the spirit and the scope of the present invention.